Please add new claims 30 and 31 as follows:

30. (New) The method of claim 24, further comprising filling the damascene structure with a liner layer and a conductive material to form a damascene feature.

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31. (New) The method of claim 30, further comprising depositing a silicon carbide barrier layer over the damascene feature.

REMARKS

This is intended as a full and complete response to the Office Action dated June 21, 2001, having a shortened statutory period for response set to expire on September 21, 2001. Claims 1-4 and 6-29 are pending in the application. Claims 14-29 stand rejected by the Examiner. Claims 1-4 and 6-13 have been withdrawn by the Examiner from consideration. Applicants cancel claims 1-4 and 6-13 without prejudice. Applicants present new claims 30 and 31 for consideration by the Examiner. Applicants believe that no new matters have been introduced.

Claims 14-29 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claims 14-29 have been amended to more clearly recite aspects of the invention. Withdrawal of the rejection is respectfully requested.

Claims 14-29 stand rejected under 35 U.S.C. § 103(a) as obvious over the combination of *Endo et al.* (US Patent No. 4532150), European Patent 0725440, *Wang et al.* (US Patent No. 4872947), and Applicants' admitted prior art. The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the silicon carbide deposition process of *Endo et al.* or European Patent 0725440 as the dielectric or barrier layers in the Applicants' prior art structure; and form the silicon carbide layers *in situ* with other materials in view of the deposition processes in the disclosure of *Wang et al.* Applicants respectfully traverse this rejection.

Endo et al. discloses deposition of silicon carbide material on a metal substrate surface. European Patent 0725440 discloses depositing a silicon carbon barrier layer on a metal surface. *Wang et al.* discloses a thermal CVD deposition of silicon oxide followed by a plasma enhanced CVD deposition of silicon oxide in the same processing chamber. Applicants' admitted prior art discloses the use of anti-reflective coatings (ARC) and photoresist materials in photolithographic processes for patterning a feature shape on a substrate surface and then etching the feature shape to form a feature definition. Applicants' admitted prior art also discloses that prior art anti-reflective coatings (ARC) have had high dielectric constants.

Endo et al. provides no disclosure of silicon carbide as a barrier layer, etch stop, or ARC, or depositing a silicon carbide layer with a low dielectric constant. Applicants' prior art further discloses that *Endo et al.* provides no disclosure of SiC as a barrier layer, etch stop, or ARC.

European Patent 0725440 does not teach, show, or suggest silicon carbide as an etch stop or anti-reflective coating as recited in one or more of the rejected claims. As disclosed in Applicants' specification, European Patent 0725440 (*Loboda* U.S. Pat. No. 5,818,071), is designed to accommodate a subtractive deposition in which the substrate deposition deposits the metal layer, then etches the metal and deposits the SiC into the etched metal layer.

Therefore, routine optimization of the silicon carbide barrier layer of European Patent 0725440 as asserted by the Examiner would not suggest or motivate depositing a silicon carbide etch stop or a silicon carbide anti-reflective coating as recited in one or more of the rejected claims.

Further, *Wang et al.* and Applicants' prior art does not teach, show, or suggest depositing silicon carbide materials, either *in situ*, or with other dielectric materials, or depositing silicon carbide materials as barrier layers, etch stops, or as ARC films.

Endo et al., European Patent 0725440, *Wang et al.*, and Applicants' admitted prior art, either alone or in combination, do not teach, show or suggest depositing a silicon carbide layer, depositing a first dielectric layer *in situ* on the silicon carbide layer, and then depositing a photoresist layer as recited in claim 14. *Endo et al.*, European Patent 0725440, *Wang et al.*, and Applicants' admitted prior art, either alone or in combination, do not teach, show or suggest depositing a silicon carbide barrier layer on

the substrate, depositing a first dielectric layer *in situ* on the barrier layer, depositing an etch stop *in situ* on the first dielectric layer, depositing a second dielectric layer *in situ* on the etch stop, depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer and depositing a photoresist layer on the silicon carbide anti-reflective coating as recited in claim 26.

Therefore, *Endo et al.*, European Patent 0725440, *Wang et al.*, and Applicants' admitted prior art, either alone or in combination, do not teach, show or suggest claimed aspects of the invention. Withdrawal of the rejection is respectfully requested.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed aspects of the invention. Having addressed all issues set out in the office action, applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

Keith M. Tackett
Keith M. Tackett
Registration No. 32,008
THOMASON, MOSER & PATTERSON, L.L.P.
3040 Post Oak Blvd., Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicant(s)

APPENDIX

14. (Twice Amended) A method of forming a silicon carbide layer on a substrate, comprising:

introducing silicon, carbon, and a noble gas into a chamber;

initiating a plasma in the chamber;

reacting the silicon and the carbon in the presence of the plasma to [form silicon carbide; depositing] deposit a silicon carbide layer having a dielectric constant less than 7.0 on the substrate in the chamber;

depositing a first dielectric layer *in situ* on the silicon carbide layer; and then

depositing a photoresist layer [on the first dielectric layer].

15. (Twice Amended) The method of claim 14, further comprising:

depositing a silicon carbide etch stop *in situ* on the first dielectric layer; and

depositing a second dielectric layer *in situ* on the silicon carbide etch stop prior to depositing the photoresist layer.

16. (Twice Amended) The method of claim 15, further comprising depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer prior to depositing the photoresist layer.

17. (Amended) The method of claim 15, [further comprising depositing a] wherein the photoresist layer is deposited on the second dielectric layer.

18. (Twice amended) The method of claim [19] 14, further comprising:

depositing a silicon carbide layer on the first dielectric layer prior to depositing [a] the photoresist layer [on the silicon carbide anti-reflective coating].

19. (Twice Amended) The method of claim 14, further comprising depositing a silicon carbide anti-reflective coating *in situ* on the first dielectric layer prior to depositing the photoresist layer.

20. (Amended) The method of claim 14, [further comprising producing a] wherein the substrate [having] has an effective dielectric constant of no greater than about 5.

21. (Amended) The method of claim 14, wherein the silicon and the carbon are derived from [a common] an organosilane compound, substantially independent of other carbon sources.

22. (Amended) The method of claim 14, wherein the silicon and the carbon are derived from a common source, and reacting the silicon and the carbon in the presence of the plasma to form silicon carbide occurs independent of the presence of a separate hydrogen source.

23. (Amended) The method of claim 14, wherein the silicon and the carbon are derived from a common source and reacting the silicon and the carbon in the presence of the plasma to form silicon carbide occurs independent of the presence of a separate carbon source.

24. (Amended) The method of claim 14, [wherein the substrate comprises] further comprising patterning and etching the substrate to form a damascene structure.

25. (Amended) The method of claim 14, [further comprising selecting] wherein the silicon carbide layer is an anti-reflective coating that has a single selected thickness to produce a reflectivity of about 7 percent or less when an underlying dielectric layer below the anti-reflective coating has a thickness from about 5000 Å to about 10000 Å.

26. (Amended) A method of *in situ* deposition of silicon carbide on a substrate, comprising:

depositing a silicon carbide barrier layer on the substrate;

depositing a first dielectric layer [on the barrier layer] *in situ* on the barrier layer;

depositing an etch stop [on the first dielectric layer] *in situ* on the first dielectric layer;

depositing a second dielectric layer [on the etch stop] *in situ* on the etch stop;

depositing a silicon carbide anti-reflective coating [on the second dielectric layer] *in situ* on the second dielectric layer; and

depositing a photoresist layer on the silicon carbide anti-reflective coating.

27. (Amended) The method of claim 26, wherein the barrier layer, etch stop, and anti-reflective coating each comprises silicon carbide material having a dielectric constant less than 7.0.

28. (Amended) The method of claim 26, [further comprising producing a] wherein the substrate [having] has an effective dielectric constant of no greater than about 5.

29. (Amended) The method of claim 26, further comprising removing a contaminant on [a] the substrate [layer] by:

a) introducing a reducing agent comprising nitrogen and hydrogen into a chamber;

b) initiating a reducing plasma in the chamber;

c) exposing an oxide on the substrate [layer] to the reducing agent.